BOTANICAL GAZETTE.

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Notes on Fungi.

BY W. G. FARLOW.

The following notes include a number of corrections of errors and some additional information with regard to species mentioned in some recent papers. In Proc. Amer. Acad. xviii. 76, it was stated that *Uredo Toxicodendri*, Berk. and Rav., is the teleutosporic form with which *Pileolaria brevipes*, Berk. and Rav., is to be associated as the uredo form. I was lead to this conclusion because, in the large number of cases which I had examined, the *U. Toxicodendri* appeared to be the prevailing form late in the season. Although the number of cases examined by me seemed large enough to allow the conclusion which I drew, the only means of deciding with certainty which is the uredo and which the teleutosporic form is the mode of germination which, at the time of writing, I had never been able to observe. During the past summer I obtained the germination of the spores of the so-called *Uredo Toxicodendri*, and found that their mode of germinating is that of a uredo and not of a teleutospore. The germinal tubes are large, and, in spite of the prominent apical papilla, the tubes in the cases I saw were more frequently lateral than apical. The spores of the so-called *Pileolaria brevipes* I have not yet been able to make germinate, after repeated attempts.

While preparing a catalogue of exotic *Peronosporæ*, a species on *Cyclanthera hystrix*, a South American cucurbitaceous plant, was noticed in the Anales de la Sociedad Cientifica Argentina, xii. 81. The species, *P. australis*, was described in 1881 by Spegazzini, but the description was not received until after my paper in the October number of the GAZETTE appeared. From the description, *P. australis* seems identical with *P. Sicyicola*, described in the GAZETTE, and the former name has priority, unless, indeed, the species should prove to be the same as *P. Cuben-*

sis, B. & C., a point which can only be settled by a comparison with the type of *P. Cubensis* in the Berkeley herbarium at Kew, the specimen in the Curtis herbarium not being satisfactory. During the past year I have received specimens of *Peronospora* from various sources, including a few forms new to this country, and largely increasing the list of host-plants of species already known to occur with us. *P. Halstedii* appears to be on the whole our most widely diffused species, and to the comparatively large list of hosts already enumerated in the GAZETTE, thirteen in all, several more species are to be added. The species reaches its most luxuriant development on species of *Silphium* and *Helianthus* in the Western States but, abundant as are the conidia, the oospores are not often met with. Mr. Holway has found what appears to be *Peronospora calotheca*, De Bary, although no oospores were seen, on *Galium Aparine* in Iowa, and *P. Viciæ* on *V. Americana*, as well as *P. Sicyicola* on *Echinocystis lobata*. I received from Mr. J. Fletcher some grapes gathered at Ottawa, Canada, in August, 1884. The young grapes and their pedicels were covered with a dense growth of *Peronospora viticola*, in fact, denser than I have ever seen on the leaves of vines. Mr. Fletcher reports that the fungus was very destructive to grapes near Ottawa. It is somewhat surprising to find such a luxuriant growth of the fungus on the grapes themselves in so high a latitude as that of Ottawa, for most of the reports of the occurrence of the fungus on the grapes have come hitherto from warmer climates.

In Proc. Amer. Acad. xviii. 85, I mentioned a form of *Exoascus*, which grows on *Rhus copallina* in Massachusetts, and stated that I believed that a similar form had been found on an African *Rhus*, but I could not recall the reference. The notice which I had in mind was a paper by Dr. F. Thomas in the Sitzungsbericht, Bot. Ver. Brandenburg, xxii. 62. The paper is entitled "Ueber ein südafrikanisches Cecidium von *Rhus pyroides* Burch," and Dr. Thomas states that No. 34 of Thuemen's Herbar. Mycolog. Oeconom. Suppl. I, which is called an *Erineum*, is not due to the action of insects, as in most of the so-called *Erinea*, but is caused by a fungus which he thinks is probably a species of *Exobasidium*. In the deformities which they produce the *Exobasidia* resemble the species of *Exoascus*, and judging by Dr. Thomas's account of the fungus found by him in a sterile condition, it seems not unlikely that it was an *Exoascus* like our own. Persons owning copies of the Herbar. Mycolog. may be able to give further information on this subject. One would not natur-

ally look to South Africa for fungous forms corresponding to those of New England, although a few fungi first described from the Cape have since been discovered in this country, of which an example is *Entyloma* (*Protomyces*) *Physalidis*, Cke. & Kalch., which, on the authority of Winter, who has examined the type of the species from the Cape of Good Hope, is the same as the form subsequently described as *Ent. Besseyi* in the GAZETTE of August, 1883, where the possible connection with *Protomyces Physalidis* was hinted.

Salix macrocarpa, Nutt., not of Andersson.

BY M. S. BEBB.

"SALIX MACROCARPA, Nutt. Leaves lanceolate, 2′–3′ long, ½′ wide, acute at both ends, at first covered with a brownish, silky down, at length glabrous, dark-green above, and bluish-white or glaucous beneath, mostly entire; stipules obsolete: aments appearing with the leaves, small, oblong, with 2–3 leaves at base: scales of the male small, blackish, oval, obtuse, somewhat hairy; of the female narrow and linear: capsules ventricose-lanceolate with long points, pedicelled, somewhat villous, but at length nearly smooth; stigmas subsessile, quadrifid."

"This species, like our pond willow (*S. grisea*), to which it is closely related, is found forming clumps in wet places where the water is stagnant, situations which it always seems to prefer to the banks of running streams. It attains a height of 3–4 ft. The branches are smooth and brownish-black, sometimes glaucous or whitish."—Sylva i. 67.

For the sake of brevity the above is condensed and rearranged from the original, but without the addition of a single word to supply any deficiency. It shows how well Mr. Nuttall distinguished the features of this marked species. Specimens received from Mr. Suksdorf, who has lately rediscovered the plant on the banks of the Columbia, where it was first found, attest the accuracy of the description given in the Sylva, as do likewise the authentic specimens in the Hookerian herbarium. The latter were in Prof. Andersson's hands, accompanied by Nuttall's characteristic label (with * to indicate n. sp), and the habitat plainly written—*Oregon!* It does seem that nothing short of sheer wilfulness could have led to any mistake, and yet Prof. Andersson gratuitously transferredthe name to a single specimen from "Hudson Bay, *Burke*," which Nuttall never saw, and described a new

species of his own, *S. Geyeriana*, which (with a single exception, to be accounted for further on) *coincides absolutely* with *S. macrocarpa*, Nutt.

True, Nuttall in his Sylva omitted to mention the habitat of his species, and in so far opened the way for misapprehension, but on the other hand, the earliest description of *S. macrocarpa* published by Andersson (Sal. Bor.-Amer. p. 19) is ostensibly drawn from "Nutt. in Herb. Hook." (not from the Sylva at all, which, we are led to infer from Dr. Gray's note, l. c. p. 32, was at this time unknown to him), and if so, why were Nuttall's own specimens not described, and the recorded habitat given, instead of something very different from the other side of the continent!

It is well known that Prof. Andersson carried forward his elaboration of the genus *Salix* under exceptionally favorable circumstances. The richest collections were placed in his hands, and every possible facility accorded him by the most eminent botanists of Europe and America. It is therefore altogether reasonable and fitting that those of more limited opportunities should accept without questioning, as I myself have done, opinions apparently reached after a careful survey of the most reliable sources of information. Such being our confidence in this distinguished monographer, it is all the more to be regretted that he did not in the present instance show a fairer appreciation of the work of Mr. Nuttall, and a more impartial criticism of his own, whereby the astonishing coincidence between *S. Geyeriana* and the older *S. macrocarpa* could scarcely have escaped his attention. The single exception, to which allusion has already been made, consists in what is said of the male aments of *Geyeriana* being "sessile, scarcely bracted, larger and thicker," and this we are able to explain in a quite unexpected and satisfactory way. Of Geyer's two specimens only the female, from which the description is almost wholly drawn, belongs to *S. macrocarpa*, the male briefly mentioned as above, belongs to an altogether different species—*S. rostrata!* And here, too, we have at last the explanation of what has all along seemed so unintelligible, the comparison by Andersson of *S. Geyeriana* with *rostrata*, and the arrangement of the two side by side, when the affinity of the plant in question —as Nuttall had the sagacity to see—is really with *S. sericea*.

I have great pleasure in restoring Mr. Nuttall's name to the plant of the Far West, which he discovered and so clearly distinguished. It may be well to remark right here, lest the name itself prove misleading, that the capsules are by no means large.

The beautiful form described in the Botany of California

differs in its more conspicuously pruinose twigs, narrower leaves grayish rather than brownish silky, and may be called *S. macrocarpa*, Nutt., var. *argentea*. The extravagant height which it is said to attain, "10–15 ft." is a quotation from Geyer's notes, and has reference doubtless to *S. rostrata*.

Some New Grasses.

BY GEO. VASEY.

BROMUS SUKSDORFII. Culms 2 to 2¼ ft. high, firm, leafy: leaves 5 or 6, 3 to 6 inches long, 3 to 4 lines wide, the 2 or 3 lower ones short, the middle ones longest, all erect, smooth; sheaths smooth, striate, all but the lower ones shorter than the internodes; ligule short and obtuse: panicle erect, narrow, 3 to 4 inches long, the branches appressed, short (½ to 1½ inches long), in twos or threes, mostly flowering to the base, with few spikelets: spikelets short-pedicelled or sessile, 3 to 5 flowered: outer glumes smooth, unequal; upper one oblong lanceolate, 5 to 6 lines long, obtusish, 3-nerved; the lower one one-fourth shorter, lanceolate, acute, 1-nerved or obscurely 3-nerved: flowering glumes 6 to 7 lines long, obtuse or acutish, soft pubescent, 5-nerved, rounded on the back; the awn 2 lines long: palet about one fifth shorter, acute, sparsely ciliate on the keels.

Collected by Mr. Suksdorf in Washington Territory, and also by Mr. Cusick in Oregon; altitude about 7,000 ft.; growing in tufts with the crowded culms perfectly erect.

BROMUS ORCUTTIANUS. Culms 3 to 4 ft. high, erect, leafy below, scabrous above: leaves 4 to 6 inches long, erect, rather rigid, smooth except on the margins; ligule short, obtuse, somewhat cartilaginous: panicle 4 to 6 lines long, erect, rather scabrous, the branches short (1 to 2 inches long), in twos or threes, rigidly spreading horizontally, sparsely flowered: spikelets 2 to 5 flowered, short pedicelled: outer glumes smoothish, scabrous on the nerves; the upper one oblong-lanceolate, 5 to 6 lines long, 3-nerved, obtuse; the lower one ¼ shorter, 1-nerved, narrower and acute: flowering glumes scabrous-pubescent, 5-nerved, rounded on the back, acutish; awn 2 to 4 lines long: palet rather shorter than the glumes, sparsely ciliate on the keels.

Collected on the mountains near San Diego by C. R. Orcutt, and also by Mr. Suksdorf on Mt. Adams, Washington Territory.

These two species are strikingly different in general appearance and habit, although the flowers are quiet similar

DEYEUXIA CUSICKII. Culms 3 to 4 ft. high, erect from a creeping rhizoma, smooth, nodes about three, distant: radical tufts numerous, with flexible curving leaves $\frac{1}{3}$ as long as the culm: culm leaves 3 to 4, light green, 9 to 12 inches long, 3 to 4 lines wide, slightly scabrous, the upper one nearly equalling the culm; sheaths smooth, 4 to 5 inches long, the upper one 7 or 8 inches; ligule conspicuous, 2 to 4 lines long, membranaceous: panicle 6 inches long, erect, rather close, $\frac{3}{4}$ to $1\frac{1}{2}$ inches wide, the branches whorled, numerous, mostly short and flowering to the base, the longer ones 1 to $1\frac{1}{2}$ inches, densely flowered, the lower whorls about 1 inch distant: spikelets closely approximated, very short pedicelled: outer glumes about 2 lines long, acute or acuminate, smooth, rather thin; the lower one 1-nerved; the upper 3-nerved and a little shorter: flowering glumes nearly as long as the outer ones, narrowly lanceolate, acuminate, smooth, thinnish, 5-nerved, bifid at the apex; awn erect, inserted a little below the middle, slightly exceeding its glume: palet nearly equalling the glume, membranaceous: hairs scanty, $\frac{1}{2}$ to $\frac{2}{3}$ as long as the flower.

Found by Mr. W. C Cusick in the Eagle Mountains, Eastern Oregon, at an altitude of 5 to 6,000 ft., growing in the shade of *Pinus contorta*, very conspicuous, but rarely sending up culms.

DESCHAMPSIA GRACILIS. Apparently annual: culms about 2 ft. high, slender, smooth: leaves filiform, not rigid, the lower ones recurving, 3–4 inches long; sheaths smooth, loose and open, the lower longer than the internodes; ligule conspicuous, 2 to 3 lines long, triangular-acuminate, sometimes split; upper half of culm leafless: panicle 6 to 8 inches long, lax and open, branches mostly in twos, the lower ones 2–3 inches long, slender, smooth, flower bearing to or below the middle, the lower joints 1 to 2 inches distant: spikelets small: outer glumes nearly 2 lines long, equal, linear-lanceolate, acute, 3-nerved, smooth, purplish, $\frac{1}{3}$ longer than both flowers: flowering glumes $\frac{1}{2}$ to $\frac{2}{3}$ line long, oblong, smooth, faintly nerved, apex broad and 4-toothed; the awn from near the base 4 times as long as its glume, bent at the middle: palet as long as its glume, narrow, ciliate above: villous hairs at the base half as long as the flower: the rhachilla also villous.

A slender, graceful species found by Mr. C. R. Orcutt on the mesas about San Diego, California.

The Menominee Iron Region and its Flora.—II.

BY E. J. HILL.

Leaving Escanaba the next morning, I went from this important shipping port for iron to the iron region proper. The village of Quinnesec, the oldest in the mining section, was chosen as a center, from which to make excursions in various directions. It is located on the southern slope of the Iron Range, a low ridge running a little north of west, in which most of the iron mines of the Menominee are found. To the west is Iron Mountain and its cluster of mines; eastward are Norway, Vulcan and the Breen mine, places where many mines are opened. This ridge crosses the Menominee River, into Wisconsin, where are other mines, but my excursions were confined to that part lying in Michigan, as far east as the Sturgeon River. After cutting through the range, the Menominee bends eastward, and for a while runs nearly parallel with it It is often rapid, from the rocks in its bed, and has two waterfalls in the vicinity of Quinnesec, the Big and the Little Quinnesec Falls, where there is a rapid change of levels, of eighty and fifty feet, respectively, each fall occupying a space of the river's course two or three times as great. As a considerable volume of water passes down these steep rapids, they are well worthy of a visit, but are now somewhat marred by the "chutes" the lumbermen have blasted through the rocks along their banks, to make a safer grade for the passage of logs. The smaller of the two, the upper, is being utilized for compressing air, to take the place of steam in the numerous mines at Iron Mountain, whither it is to be conveyed several miles in a large pipe. South of the lower fall, the Sturgeon River enters the Menominee, crossing the Iron Range from the north, also with rapids and falls and wild gorges, particularly where it cuts through the adjoining quartzites lying northward. South of the ridge the land is mostly a pine plain. On the north slope, and in the valley of Pine River, a branch of the Sturgeon from the west, the land is richer, and the hard woods are more abundant, as well as on the less sandy parts of the range itself and the quartzite formation.

The three lakes already mentioned are but a short distance from Quinnesec, and easily reached on foot or by cars. The outlets of Lakes Antoine and Fumee cross the southern barrier and enter the Menominee. Lake Hanbury lies south of the range, hence the botanical collector gets a varied field for examination.

Where the ground had been freed from timber by the ax or fire, there was but little variety, the Bracken Fern (*Pteris aquilina*) often almost hiding the ground. Interspersed were the blackberry, red raspberry, and the Hispid Aralia. The trees taking the place of the old ones were the two poplars, *P. tremuloides* and *P. grandidentata*, *Betula papyracea*, and the oaks, *Quercus coccinea* and *Q. rubra*, rather small and shrubby. On the whole, these desolated tracts were a barren, uninviting field for exploration. In clearings and burnt districts the tall, symmetrical form of *Arabis perfoliata*, Lam., was noticeable. *Epilobium angustifolium* was everywhere present in such localities. Here, also, was found *Physalis grandiflora*, Hook., with large, white flowers, the largest of the genus in our flora, a representative of the Lake Superior district.

Waldsteinia fragarioides, Tratt, was seen throughout on the hills and in dry open woods. In similar places was *Cynoglossum Virginicum*, L., replacing *C. officinale* as a weed. Dense patches of the white-flowered raspberry (*Rubus Nutkanus*, Mocino) were often met with, so like the purple-flowered in foliage and general appearance, differing mainly in its large white flowers. On the high hills grew the Mountain Alder (*Alnus viridis*, DC.), now in fruit, and bearing quite a close resemblance to small forms of its relative, *Betula pumila*, L., found in bogs farther south. The soil of these hills is a sandy or clayey loam, usually thin, stony and reddish, from the presence of iron oxides. Where firm and more solid, the maple, elm, basswood, birch, hemlocks and other hardwoods grow, making quite a dense and heavy forest growth.

On the lower sandy hills and pine plains, largely covered with a thick growth of *Pinus resinosa*, if the forest was still intact, a different flora is seen, not indeed exclusively confined to them, but characteristic. It is not extremely varied, but always interesting, the Ericaceæ predominating. Among the more noticeable plants were *Moneses uniflora*, various Pyrolas, *Monotropa Hypopitys*, L., *Lysimachia quadrifolia*, L., the grass *Brachyelytrum aristatum*, Beauv., *Vaccinium Canadense*, *V. Pennsylvanicum*, and *Gaultheria procumbens*. The low blueberry, from the middle to the 25th of July, was ripening its fruit abundantly, producing the largest and finest berries I had ever seen, which could be picked by the handful from almost any bush, and with which the appetite was often satisfied on these solitary walks. The greatest profusion of fruit was in the open woods, or where the trees had been removed from tracts not yet overrun by taller shrubs. The

ground was also reddened in many spots by the ripe fruit of the common wintergreen. Birds were not abundant, a fact I had noticed two years before at Sault St. Marie, and the berries are so plentiful that even if they were a vast number would be left untouched. In the open plains grew great quantities of *Polygala polygama*, Walt., with aerial and subterranean stems branching by the score from a single root, making a large tuft of stems, seemingly to rival Vaccinium and Gaultheria in the effort to keep the ground stocked with seed. And it doubtless had one advantage from its floral habit, its seeds being planted from the first.

In the colder and denser woods, where the white pine and hemlock were more common, the fetid-current, *Ribes prostratum*, L'Her., frequently occurred. In such places, growing among the moss, the dwarf Pyrola (*P. secunda*, var. *pumila*), was not uncommon. Here also, or in higher lands by streams, or in damp woods, was the prettiest of the wood sorrels, *Oxalis Acetosella*, L., with handsome flowers of purple and white.

Along the streams in copses grew a large-leaved honeysuckle, *Lonicera hirsuta*, Eaton. In open, grassy places, or on the rocky banks of streams, the common strawberry was *Fragaria vesca*, L., almost wholly replacing *F. Virginiana*. The latter was also found, but not very abundantly, in such situations. *F. vesca* was plainly native. Its fruit, sometimes three-fourths of an inch long, often as tapering as a sugar-loaf, as well as having the achenia superficial, is quite in contrast with that of its congener. In the muddy places of a stream that drains a swamp at Nornay was gathered the terrestrial form of *Callitriche verna*, L. Growing along with it, the water having been dried away, was a terrestrial form of *Hippuris vulgaris*, fruiting at a height of two to six inches, and seemingly at first sight a plant quite unlike the ordinary one found in water. It was dwarfed by drought, and showed that water was not absolutely necessary to its existence, though the want of it materially affected its size.

In the peat bogs, and cedar and tamarack swamps, the vegetation was quite different. *Cypripedium spectabile* was found in bloom in one at Norvay as late as July 18th. I was also able to get *Ledum latifolium*, Ait., and *Valeriana sylvatica*, Richards, in flower at the same time and place. In the bogs by the side of Hanbury Lake, *Habenaria dilata*, Gray, was common. *Eriophorum vaginatum* also grew here. Orchids in the contiguous cedar swamp were *H. obtusata*, Richardson, here, as elsewhere, exhibiting a great variety in the form of its leaves, so that a num-

ber of specimens are needed to exhaust the list of them. *H. orbiculata*, Torr., with its two large leaves close to the ground, round or roundish in outline, was another kind. A single specimen only of *Listera cordata*, R. Brown, was seen, though more were diligently sought after. In the cedar swamp at the west end of Lake Fumee, near the Norvay mine located there, I came across *Habenaria rotundifolia*, Richardson, with handsome rose-purple flowers. The leaves were generally oblong. I had never seen it till then, and it is evidently quite rare from the few stations assigned it. It is not mentioned in any catalogue of Michigan plants. *Pyrola rotundifolia*, L., var. *uliginosa*, Gray, grew in the same locality. Deep beds of moss often covered the dryer places of these swamps, aside from species of *Sphagnum* that everywhere formed a covering in damper parts among the tamaracks and cedars. Species of *Dicranum* and *Hypnum* were particularly abundant, as *Dicranum scoparium*, Hedw., and *D. undulatum*, James, growing upon the hummocks.

A day was taken for Lake Antoine, a beautiful expanse of water near Iron Mountain, but not many new things rewarded the search. *Danthonia spicata*, Beauv., grew along its rocky shores, varying a little in some characters, *Habenaria Hookeri*, Torr., and *Liparis Loeselii*, Richard., were found in the adjoining open woods. *Eleocharis palustris*, R. Br., var. *calva*, Gray, grew on the wet gravelly shores, and *Eriocaulon septangulare* in the shallow water. In neighboring sloughs *Utricularia intermedia*, Hayne, abounded.

The rock-flora is still to be mentioned, not an insignificant factor in a region where there are so many outcrops and ledges, into which streams had cut deep channels, and were often hemmed in by high cliffs. Precipitous ledges were met with in the midst of the woods, their crevices being occupied by mosses and ferns, among which other plants gained a foothold. *Polypodium vulgare* and *Cystopteris fragilis* were among the most usual ferns. *Woodsia Ilvensis*, R. Br., was found near the lower falls of the Quinnesec. *Corydalis aurea*, Willd., grew in large mats on the rocks at the same place, and on those of the hills at Quinnesec, its stems sometimes being three feet long, many branching from the same root. I had never before seen such a luxurious growth of it. The petals were wing crested and pointed, varying towards *C. flavula*, Raf., but it can only be called an intermediate form, though the common descriptions do not embrace its characters. Other gatherings here were *Oenothera pumila*, L., and the little moss, *Rhabdoweisia fugax*, Br., & Sch. At the Sandy

Portage, a few miles down the river, *Hypericum Kalmianum*, L., grew in hollow places of the rocks near the water, quite different in habitat from that in the wettish sands at the head of Lake Michigan. *Rhabdoweisia fugax* also grows in the dry sands near Englewood, and at Whitings, Ind. The hare-bell, *Campanula rotundifolia*, was everywhere abundant in such places.

On ledges of the Iron Range at Quinnesec were gathered *Dracocephalum parviflorum*, Nutt., with purple flowers, and *Symphoricarpos racemosus*, Michx., var. *pauciflorus*, Robbins, and *Bromus Kalmii*, Gray. On the cliffs of the stream which forms the outlet of Lake Fumee, which has several pretty waterfalls as it crosses the Iron Range to the river below, was a form of *Arabis Drummondii*, Gray, with rose-colored petals scarcely longer than the calyx Covering the faces of the dripping rocks *Hypnum filicinum*, L., grew in large sheets.

One more moss may be mentioned, of quite singular appearance, growing by paths in sandy and clayey woods, *Trematodon longicollis*, Rich. Nor must an introduced plant, found near the railroad at Vulcan, be omitted, *Echium vulgare*, L., that has taken a long stride northward and become well established.

The foregoing is not designed to be a complete account of even the summer flora of the Iron Region, but only as indicative of some of its more striking features, such as interested the writer, and presumably may also interest others. Many mosses were collected, the greater part of which still remain to be critically studied, having been partly left in anticipation of the work of Lesquereux and James, since the reception of which time has not been at command. But so far as studied, the moss flora does not materially differ from that already made out for the region around Sault St. Marie, and at Mackinaw, and the northern counties of the southern peninsula of Michigan, where several summers have been spent more or less in personal investigation. It is varied and luxuriant, and has features that, to some extent, characterize that of Lake Superior, or even British America.

GENERAL NOTES.

A New Classification of Plant Tissues.—In Dr. G. Haberlandt's recent work on the "Physiological Anatomy of Plants," published by Engelmann, of Leipzig, there are several changes in doctrine which teachers and workers would do well to note, and adopt or not as they see fit. Sachs' "Fundamental System" of tissues is rejected, as we think, with good reason. It could only be

defined in a negative way, as those tissues which were neither epidermal nor fibro-vascular, no real positive character grouping them together. The author proposes rather a basis of function, which sounds well, provided function can always be clearly made out. We have then such groupings as "Protective System," "Mechanical System," "Conducting System," etc., all grouped under the two general heads of protection and nutrition. Such arrangement, for instance, puts bast and wood-cells among protecting tissues, and tracheary tissue, sieve vessels, soft bast, etc., among conducting tissues, under the nutritive group. This may do for a physiological grouping, but the anatomist will yet demand that the fibro-vascular bundle, for instance, be considered some how as a whole. Dr. Haberlandt thinks that wood-cells are purely mechanical and not at all conductive, and that tracheary tissue conducts, not air, but water. The fact that tracheary vessels have no connection with intercellular spaces or stomata is taken as evidence of a low pressure of air within them, thus, perhaps, inducing suction to some extent. The ordinary tracheary vessels are for the "through passage" of water, but tracheides for local distribution and so abound in leaves. The conductive tissue for proteids consists of the soft bast and sieve tubes. The book is a valuable one, but is itself an illustration of the fact that a classification of tissues upon the basis of function, however desirable, is not practicable in the present state of our knowledge.

Dr. H. C. Beardslee.—It is our painful duty to record the death (in December last) of a constant subscriber and contributor to the GAZETTE, Dr. H. C. Beardslee, of Painesville, Ohio. Some years ago he published a catalogue of the plants of Ohio, which he perfected before his death. Owing to a failure in the appropriation for the publication of the Geological Survey of Ohio this completed catalogue has never been printed. Dr. Beardslee's herbarium is now at Oberlin, consisting of about 4,000 species, and being especially rich in Carices, Grasses, and Salices.

EDITORIAL NOTES.

MR. GEORGE BENTHAM bequeathed £1,000 to the Linnean Society.

DR. PARRY will remain abroad during the winter. He is spending much time at the Kew Herbarium.

CENT. XIV AND XV of Ellis' North American Fungi will be issued soon. Cent. XV is to be devoted to Uredineæ.

THE HERBARIUM of Dr. Göppert, recently deceased, has been bought for the botanical garden at Breslau for $1,000.

THE HERBARIUM of Cornell University has been estimated to be worth $1,800, as evidence in the McGraw-Fiske will suit.

THE CHAIR OF BOTANY in the Iowa Agricultural College has been tendered to Dr. B. D. Halsted, editor of the *American Agriculturist*.

THE HERBARIUM of the late Duval-Jouve has fallen to the Faculté des Sciences, at Montpellier, the place of his residence.

A FRENCH SOCIÉTÉ MYCOLOGIQUE will be established with the beginning of the new year, with Dr. A. Mougost, of Bruyères, Vosges, as secretary.

OF THE WORKERS who have been really studying the diatom shell, none seems entitled to greater credit than Dr. J. D. Cox, ex-Governor of Ohio.

THE TRYING PERIOD through which the study of the rusts (*Uredineæ*) is now passing is leaving its impress upon the nomenclature in such specific names as *rexans* (Farlow) and *perplexans* (Plowright).

THE POLLEN GRAINS and an anther of *Papaver Rhœas*, taken from funereal garlands found in Egypt, have been figured by C. A. White, in the Journal of the Linnean Society. The Garlands were made about 1000 B. C.

H. KLEBAHN believes that the chief function of lenticels is to facilitate the admission of gases to the interior portions of the cortex. Otherwise their entrance would be almost blocked by the impervious outer portions.

THE AMOUNT of insoluble mineral substances which acumulate in the leaves of plants has been found to be in some cases as much as 20–25 per cent. of their weight. In stems the per centage is much lower, and in roots still less.

MARSILEA MACROPUS Hook., bearing the common name of Nardoo, is recommended by R. Schomburgk, Director of the Botanic Garden of South Australia, as a valuable forage plant for that country. The sporocarps are used as food by the natives.

A PAPER ON THE MYXOMYCETES, their habitats, modes of collection, preservation, etc., prepared by Dr. George A. Rex, of Philadelphia, one of the most successful and enthusiastic students of these plants in this country, will be given in an early number of the GAZETTE.

THE FIRST ANNUAL REPORT of the Agricultural Experiment Station of the University of Wisconsin contains botanical matter of special interest. Corn smut is treated by Prof. W. A. Henry, and the onion mold, apple scab and leaf blight, and when the leaves appear, by Prof. W. Trelease.

MR. HENRY O. FORBES, studying the contrivances for fertilization in certain tropical orchids, comes to the conclusion that "a number of orchids are not fertilized by insects, but are so constructed as to enable them to fertilize themselves." The paper was read before the Linnean Society.

MR. E. S. GOFF, in an article on the "Relation of Color to Flavor in Fruits and Vegetables," in the *American Naturalist* for December, points out what appears to be a constant relation between the variation in color of the edible portion and its mildness and flavor—the lightest colored being the mildest.

MR. CHAS. PLOWRIGHT, at a recent meeting of the Linnean Society, speaking with reference to the reproduction of certain *Uredineæ*, affirmed that when reproduction takes place without æcidiospores, the resulting uredospores are far more abundant than when they come from æcidiospores sown upon the host-plant.

MR. ROMEYN B. HOUGH, of Lowville, N. Y., is preparing a work of very thin sections of wood and accompanying text. The first volume, to be issued in the spring, will embrace twenty-five species, each with radial, tangential and transverse sections. It promises to be superior to any work of the kind yet published.

WE SEEM to be nearing a solution of the vexed question of the structure of the diatom shell; therefore the discussion becomes of some interest to botanists. Let us be thankful that there are found students who are not content with "resolving" *Pleurosigma* or "fighting objectives" on some of the numerous "test (?) objects," "dry," "in balsam," with "central" or "oblique" light!

THE JOURNAL OF MYCOLOGY is announced as a new monthly journal, devoted to fungi, edited by Prof. Kellerman, of the Agricultural College of Kansas, J. B. Ellis, of Newfield, N. J., and B. M. Everhart, of Westchester, Pa. It is to be issued in place of *Schweinitzia*, mentioned some time since. It proposes to give an account of the current literature of the subject with descriptions of new North American species and monographs of genera.

JOURNALS THAT PUBLISH new species, or make any important announcements, should be compelled to print the date of their publication. A journal bearing the imprint of January, and distributed to its subscribers in March, is manufacturing priority in a wholesale way, and if any question of priority should arise, as is often bound to be the case in descriptions of new species, some very unjust decisions might be made. The GAZETTE is ready to follow its own suggestion.

MR. J. D. KING, of Cottage City, Mass., offers for sale carefully prepared and mounted sets of microscopic slides, showing the position of the resin ducts and development of the hypoderm cells of the 60 species of *Abietineæ* which occur within the limits of the United States, and which botanists will now be able to examine critically. The specimens are made from material furnished by Professor Sargent, of Harvard College. The price of entire sets of 60 slides is $25, and selections of a less number $6 a dozen.

WHAT IS BELIEVED to be the first described case of the occurrence of a three-sided conical apical cell in the leaf of any plant has been published by F. O. Bower, in the *Proceedings of the Royal Society*, of London. The apices of the young leaves of *Todea superba* and *Osmunda cinnamomea* are occupied by such cells, from the three sides of which segments are cut off in the usual way. The cell is so placed that one side faces the upper surface, while the other two stand obliquely to the under surface. The discovery is an important one, as it helps still further to bridge the gap between the Ferns and Cycadeæ.

THE FOLLOWING BOTANICAL papers have been presented to societies recently: The grasses mechanically injurious to live stock, by Prof. W. H. Brewer, before the National Academy, at Newport, in October; Illinois forests and forestry, by Prof. T. J. Burrill; Notes on marine algae, Recent investigations on the rise of sap in trees, and Some corn fungi, by Mr. A. B. Seymour, before the Illinois State Natural History Society, in July: Trees and shrubs of

Northern Japan, before the Montreal Horticultural Society; and Plants in their relation to disease, before the Massachusetts Horticultural Society, both by Prof. D. P. Penhallow.

Mr David F. Day tells us, in the *Gardener's Monthly*, for January, that he has given much thought to the relation of the form of the flower to its position on the plant, and has arrived at the following conclusions: (1) "A flower, completely regular, is normally either erect or pendulous, and (2) a flower which is irregular, is normally always lateral," and furthermore adds that he has failed to find any published statement to this effect. By consulting Gray's Structural Botany, p. 219, he will see that Sprengel made the observation nearly a century ago, and also had a fair notion of its significance. Mr. Day also notes that where the flower is erect the stamens exceed the pistils in length, but where pendulous the pistils exceed the stamens, i. e, the anthers in either case are above the stigmas. This is, however, an empirical rule to which many exceptions are easily found, and is only valuable as in the preceding case, when considered in connection with the mode of fertilization.

CURRENT LITERATURE.

List of, and Notes upon, the Lichens collected by Dr. T. H. Bean in Alaska and the adjacent region in 1880. By Dr. J. T. Rothrock. Proc. U. S. Nat. Mus. vii. 1, 1884, Washington, D. C.

This is quite a creditable collection of lichens, especially when we consider that Dr. Bean was busy about everything else. Dr. Rothrock says that the accuracy of specific names is due to Mr. Henry Willey, whose name is a very familiar one to students of this group. The list contains 110 species, one being a new *Biatora* from E. Siberia.

Catalogue of Canadian Plants. Part II. Gamopetalæ. By John Macoun. Montreal: Dawson Bros., 1884. 100 pp.

This, like its fellow, is an exceedingly handsome pamphlet. The catalogue is a very complete one, and it would be hard to say what it needed to make it more so. Range, stations, habitat, collectors, and important synonymy are well given, and one turns over these handsomely printed pages with the feeling that our Canadian friends are working together in a good cause, with a hearty good will, and a liberal backing in the Geological and Natural History Survey of Canada. The Gamopetalæ embrace 255 genera and 908 species. This remarkably resembles the display of the Polypetalæ, which numbered 243 genera and 907 species. Naturally we turn to our great family of Compositæ and find it includes 81 genera with 374 species, and in this family the great genus *Aster* numbers 54 species, with the acknowledgment, at the close, that Aster is in "great confusion." When will it not be? *Erigeron* numbers 25 species, which can not really be separated from *Aster*, thus making the group contain about 80 species, with several other outlying genera. The other genera then fall pretty much into the same order that American botanists are familiar with. We note that *Collomia* is still retained as a genus, although all distinctions between it and *Gilia* have broken down. Another part will complete the exogens.

Catalogue of the Flora of Minnesota, including its Phænogamous and Vascular Cryptogamous Plants. By Warren Upham. Minneapolis, 1884. 8vo. 193 pp.

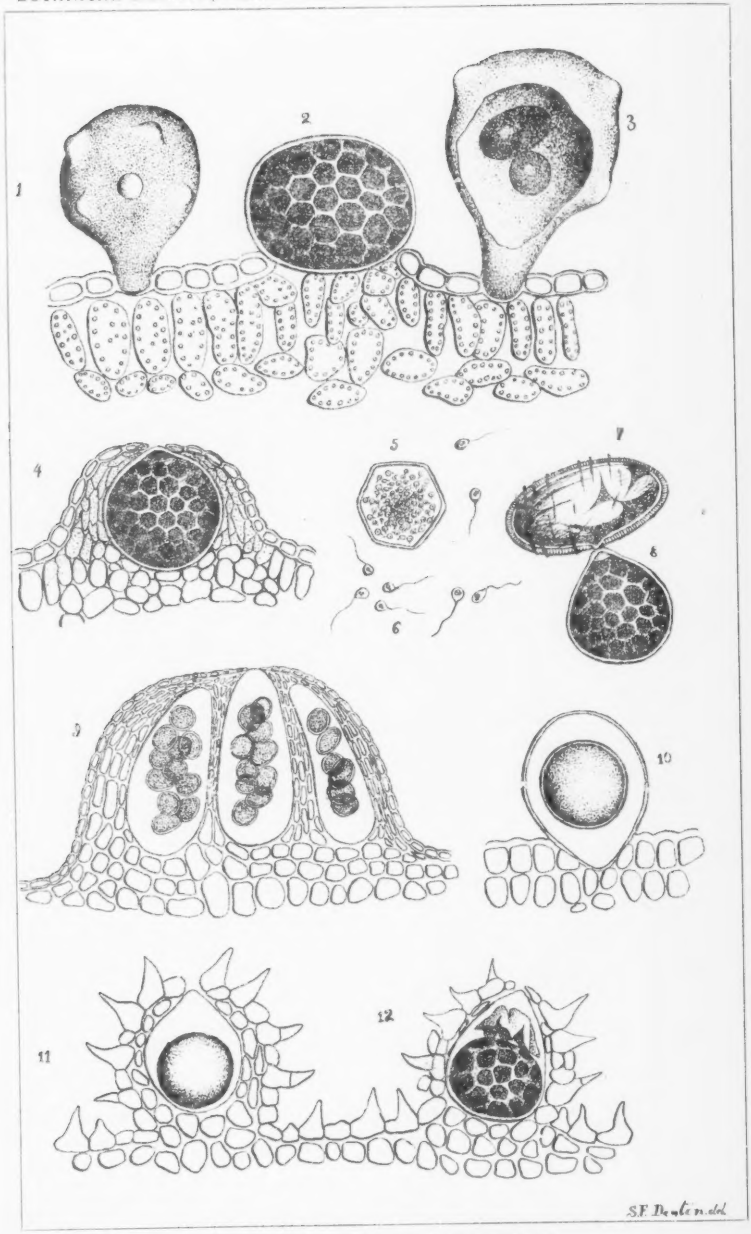
This is in many respects a model local flora. It has received the utmost care in preparation, and contains all that is known regarding the occurrence and distribution of the plants of the State, enumerating 1,650 species and varieties. Its compilation has been in progress several years during the more active labors of the author on the geology of the State, it being in fact a portion of the work of the Natural History Survey of the State, and forming a part of the annual report of progress for 1883. If we, therefore, consider it to be chiefly a report of progress as it professes to be, a systematic account of the observations of others supplemented by the very full observations of the author, we can not conceive of a more admirable preparation for the final work of the survey in which the plants of the State will be catalogued with an adequate herbarium as a substantial basis to put its genuineness beyond all question, and such a catalogue we are assured is in contemplation, to include also the lower cryptogams.

A number of features of this list are worthy of special mention. The excellent account of the sources of information shows that twenty-one lists of plants, partially or wholly belonging to Minnesota, have been published at various time, beginning in 1822, and that some forty collectors lent their assistance in addition. The conditions determining the character of the flora, the range of species, introduced plants, review of the catalogue and comparison with the flora of other States and Europe, are topics treated with much interest, but our space will only permit their mention. An excellent map shows the extent of forests, and the limits of a number of trees and shrubs. Species not in Gray's Manual are described at the foot of the page where they occur. A caution should be noted for those who copy descriptions from Gray's Synoptical Flora, pointed out by Mr. Sereno Watson. The specific descriptions of the large genera are partly distributed to the sub-characters, so that if only the characters following the specific name be taken they will not always be sufficient to distinguish the species, particularly in Aster and Solidago.

The excellent typography, ample citation of localities, frequent interesting notes, latest nomenclature, and an ample index lend value to the catalogue.

Comparative Anatomy of the Phanerogams and Ferns. By Dr. A. De Bary. Translated and annotated by F. O. Bower and D. H. Scott. Clarendon Press: Oxford, 1884. 659 pp.

Botanists will hail with delight this English translation of De Bary's Vergleichende Anatomie, just issued from the Clarendon Press. The original has long been in demand in our laboratories, but this translation will put many workers upon an easier footing. Its 660 pages contain an enormous mass of facts with reference to vegetable histology, and a complete index brings all of it within easy reach of the student. The book is divided into two parts, viz., Forms of Tissue and their Arrangement. The forms of tissue are given as *cellular tissue* (epidermis, cork and parenchyma), *sclerenchyma, secretory reservoirs, tracheæ, sieve tubes,* and *laticiferous tubes.* It is an indispensable book to every student of vegetable histology and should find large sale in this country.



FARLOW ON SYNCHYTRIA.